

31. HISTOLOGICAL STUDIES OF SCARLET RED PATCH INDUCED BY THE WHITEFLY *BEMISIA TABACI* (GENNADIUS) ON UNDERSURFACE OF LEAF OF *ACHYRANTHES ASPERA* LINN.

(With a photograph and two text-figures)

The whitefly *Bemisia tabaci* is a well known pest of cotton, tobacco and cassava and also a vector of virus diseases in many crops. It has been established by Mound (1963) and also by David & Ananthakrishnan (1976) that considerable variations could occur in the structural details of the pupal case of *B. tabaci* and *Trialeurodes rara* in relation to the nature of the leaf.

On *Achyranthes aspera*, the aleyrodid *Bemisia tabaci* has been found to cause beautiful scarlet red irregular patches on the underside of the leaves (hypophyllous). These patches are solid parenchyma emergences from

the epidermis and appear more or less circular, fleshy and granular or rugulose in shape (Mani 1973). In a small clear area in the patch the nymph of *B. tabaci* is seen lodged surrounded by the parenchyma emergences (Photo. 1). The size of the patch measures around 1-5 mm in diameter. This type of infestation on *A. aspera* is noticed throughout India, particularly during the monsoon periods.

The histological study of the scarlet red patch induced by the whitefly *B. tabaci* on underside of leaf of *A. aspera* is reported here.

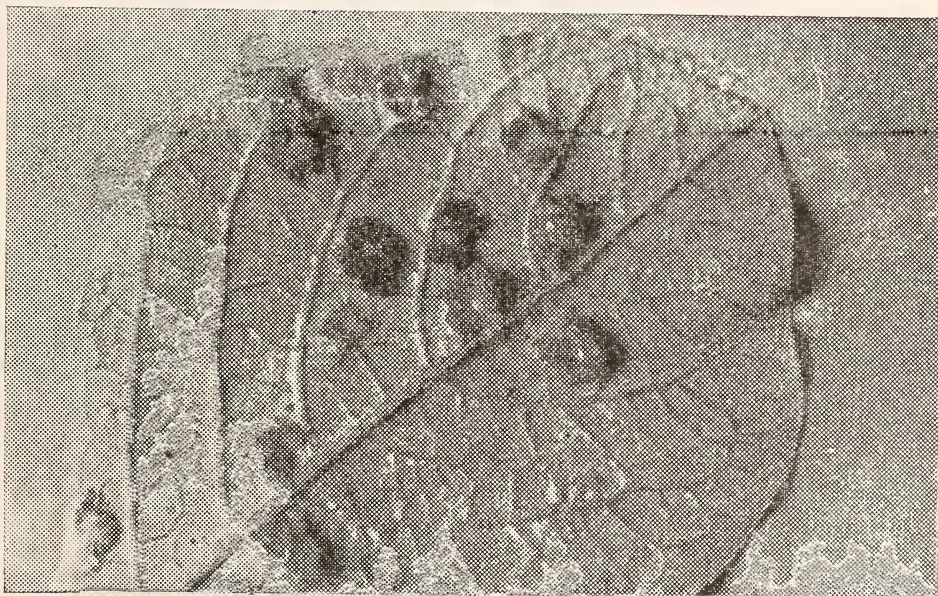


Photo 1. Nymph of *Bemisia tabaci* surrounded by parenchyma emergence on *Achyranthes aspera*.

MATERIAL AND METHODS

Small bits of scarlet red patches were neatly cut from the leaves of *A. aspera* and fixed in formalin, acetic acid and 70% ethyl alcohol (FAA) in the ratio of 5:5:90. After keeping the leaf portions for 24 hours they were processed following the standard procedure adopted for studying the histology of leaf tissues (Jensen 1962).

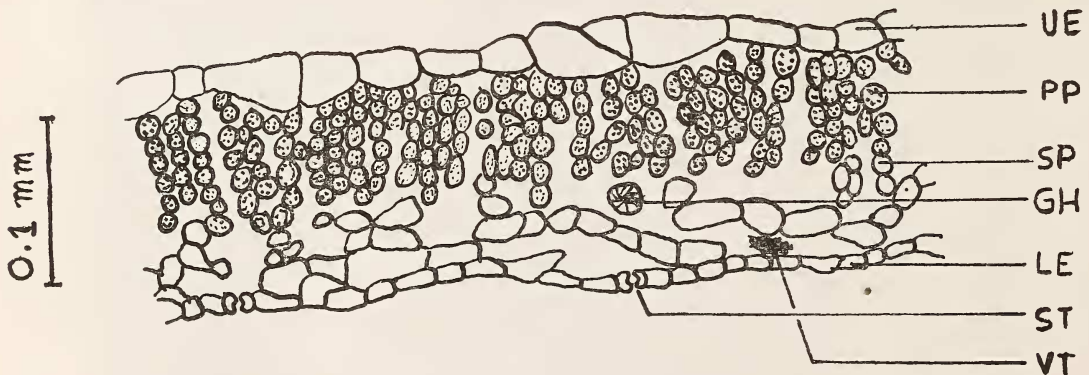
Sections of ten micron thickness were obtained by use of rotary microtome. Staining of the cells were done using safranin and fast-green, cleared and mounted on a clean glass slide using DPX mountant. The slides were then observed under Carl Zeiss compound microscope and camera lucida diagrams were made.

RESULTS

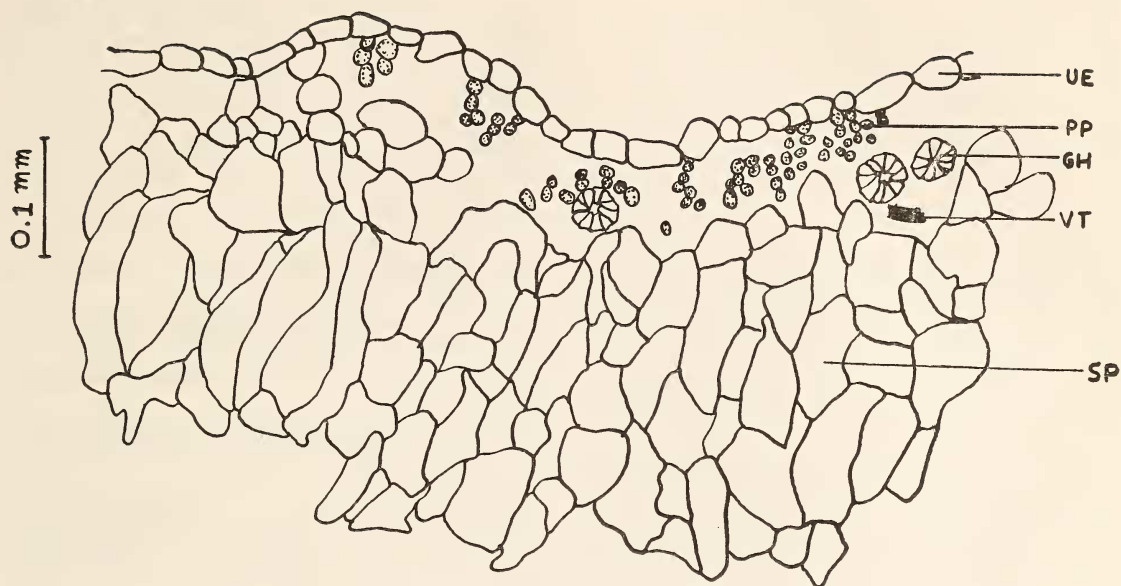
Normal leaf (Fig. 1). The upper epidermis consists of rectangular shaped cells. Next to the epidermal layer is found the palisade parenchyma consisting of 3 to 6 rows of darkly

stained spherical cells with chloroplasts. Below the palisade parenchyma the spongy parenchyma is present with large air spaces between the cells. Two to three yellowish brown glandular hairs are noticed occupying the junction of palisade and spongy parenchyma layer. The lower epidermis consists of rectangular cells and harbours stomata in a few places. Epidermal hairs are also present. The mesophyll contains the vascular tissues.

Leaf with patchy region (Fig. 2). The cells of the upper epidermis are slightly larger in size. The palisade parenchyma is greatly reduced compared to the normal leaf and in some places it is almost absent. However, the spongy parenchyma occupies two third of the leaf tissue in the patchy region consisting of about six rows while it is one to three rows in the normal leaf region. The cells of the spongy parenchyma are three to four times greater in size ($61.17-86.38 \mu$) than the cells of the spongy parenchyma ($18.51-24.68 \mu$) present in the normal leaf. Their shape is highly irregular. Glandular hairs are more in number in the patchy region. Vascular bundles are scarce in



C. S. of leaf of *Achyranthes aspera*.
 Fig. 1. Normal leaf. (UE — Upper epidermis; PP — Palisade parenchyma; GH — Glandular hair; SP — Spongy parenchyma; LE — Lower epidermis; ST — Stomata; VT — Vascular tissue.)



C. S. of leaf of *Achyranthes aspera*.

Fig. 2. Leaf with patchy region. (UE — Upper epidermis; PP — Palisade parenchyma; GH — Glandular hair; SP — Spongy parenchyma; VT — Vascular tissue.)

this region. The cells of the lower epidermis are isodiametric in the place of origin of the patchy region which gets completely obliterated and its place is occupied by the spongy parenchyma.

DISCUSSION

Of the nearly 700 Indian plant galls reported by Mani (1959), the aleyrodids constitute not even one per cent, thereby clearly indicating their ineffectiveness as gall makers.

The scarlet red patch lodging the aleyrodid nymph *B. tabaci* (= *B. achyranthes*) was first reported by Singh (1931) followed by Rao (1958). A similar type of pink coloured fleshy emergence on *Ruellia prostrata* Poir. induced by *B. tabaci* was also reported by Mani (1959, 1973). Histological studies of the pitgalls of aleyrodid is restricted to that of Krishnamurthy *et al.* (1973) on *Morinda tinctoria*

caused by *Indoaleyrodes pustulatus* and concluded that whiteflies are very poor gall makers.

The present study is the first attempt on the histology of patch-like emergences induced by *B. tabaci*. The study clearly indicates complete suppression of palisade parenchyma and proliferation of spongy parenchyma which is pigmented giving rise to the scarlet red patch like appearance. Further detailed studies are essential to elucidate information as to how the aleyrodid nymph is responsible for the proliferation of tissues into scarlet red patches around the site of feeding and the reasons for development of such pigmented tissue which has not been noticed in any other instance excepting *R. prostrata* though *B. tabaci* is highly polyphagous. There is also need to investigate whether the *B. tabaci* occurring on *A. aspera* is a different biotype.

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32. BIOECOLOGY OF *SPHEDANOLESTES ATERRIMUS* DISTANT (HETEROPTERA: REDUVIIDAE)

(With a text-figure)

INTRODUCTION

Certain aspects of the bioecology of the assassin bugs of the scrub jungles of Tamil Nadu including their efficient ecotypical adaptations in their nutrition, reproduction and ethology have been already documented. (Ambrose 1980; Ambrose and Livingstone 1978 a, b, c and 1979 a and b, Haridass and Ananthakrishnan 1980 a and b and Livingstone and Ambrose 1979 a and b and 1984). *Sphedanolestes aterrimus* Distant, is a violaceous black, crepuscular, entomosuccivorous, polyphagous, alate (both sexes) reduviid found in the Azhagarmalai tropical rainforest as well as in the higher altitudes of Maruthamalai scrub jungle, where the tropical rainforest

conditions prevail. Both nymphs and adults of *S. aterrimus* were collected from the litter of *Tamarindus indicus* in Azhagarmalai. Nymphal instars of another reduviid, *Sycanus ater* and both adults and nymphal instars of several species of blattids were also found as cohabitants of this species. In Maruthamalai, they were collected from the scrubs as well as underneath stones. The insect was usually found in pairs and a maximum of 9 adults (both sexes) and 4 nymphal instars were found occupying a single microhabitat.

MATERIALS AND METHODS

S. aterrimus is polyphagous and the adult insects collected from the field were reared in